

Application No. 10/707,489
Technology Center 1762
Amendment dated August 16, 2007
Reply to Office Action dated April 16, 2007

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A process of depositing a ceramic coating on a surface, the ceramic coating comprising multiple different oxide compounds and an oxide of a metal, the process comprising the steps of:

using at least one evaporation source to provide the ~~multiple~~ different oxide compounds and a ~~at least one~~ carbide compound comprising carbon and the metal; and ~~an element~~; and

evaporating the at least one evaporation source in the presence of oxygen to dissociate the metal from the carbide compound, oxidize the metal, and to produce a vapor cloud that contacts and condenses on the surface to form the ceramic coating, the ceramic coating comprising the oxide compounds, the oxide of the metal dissociated from ~~an oxide of the element~~ of the carbide compound, and at least one of elemental carbon, a carbon-containing gas, and precipitates of the carbide compound.

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Claim 2 (Currently amended): A process according to claim 1, wherein the oxide of the metal -element- has a vapor pressure that is at least an order of magnitude different than the vapor pressure of at least one of the oxide compounds.

Claim 3 (Currently amended): A process according to claim 1, wherein the carbide compound is at least one of YbC_2 , NdC_2 , and LaC_2 , whereby the oxide of the metal -element- is at least one of Yb_2O_3 , Nd_2O_3 , and La_2O_3 .

Claim 4 (Original): A process according to claim 1, wherein the oxide compounds are yttria and zirconia and are present in the evaporation source as yttria-stabilized zirconia.

Claim 5 (Original): A process according to claim 4, wherein the carbide compound has a vapor pressure within one order of magnitude of the vapor pressure of zirconia.

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Claim 6 (Currently amended): A process according to claim 1, wherein the at least one evaporation source comprises two evaporation sources, the oxide compounds are present within a first of the evaporation sources, and the ~~at least one~~ carbide compound is present within a second of the evaporation sources.

Claim 7 (Currently amended): A process according to claim 6, wherein the first evaporation source consists of the oxide compounds and the second evaporation source consists of the ~~at least one~~ carbide compound.

Claim 8 (Currently amended): A process according to claim 1, wherein the at least one evaporation source consists of a single evaporation source, and the oxide compounds and the ~~at least one~~ carbide compound are present within the single evaporation source.

Claim 9 (Currently amended): A process according to claim 1, wherein the ceramic coating consists of the oxide compounds, the oxide of the metal ~~element~~ of the carbide compound, and at least one of the carbide compound and the carbon-containing gas.

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Claim 10 (Currently amended): A process according to claim 1, wherein the vapor cloud initially condenses on the surface so that the carbide compound is present in the ceramic coating, and the carbide compound is then reacted in situ to form the oxide of the metal ~~element~~ of the carbide compound and the carbon-containing gas.

Claim 11 (Original): A process according to claim 1, wherein the carbon-containing gas is chosen from the group consisting of carbon dioxide and carbon monoxide.

Claim 12 (Currently amended): A process of depositing a thermal barrier coating on a surface of a gas turbine engine component, the thermal barrier coating comprising yttria-stabilized zirconia and an oxide of a metal chosen from the group consisting of ytterbium, neodymium, lanthanum, and combinations thereof, the process comprising the steps of:

placing the component in a coating chamber containing at least one ingot that provides zirconia, yttria, and a ~~at least one~~ carbide compound of the metal; ~~chosen from the group consisting of YbC_2 , NdC_2 , and LaC_2 ;~~
projecting a high-energy beam on the at least one ingot in the

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presence of oxygen to melt the at least one ingot, dissociate the metal from the carbide compound, oxidize the metal, and form a vapor cloud; and

allowing the vapor cloud to contact and condense on the component to form the ceramic coating, the ceramic coating comprising yttria-stabilized zirconia, the at least one oxide formed by oxidation of yttrium, neodymium, yttria, neodymia, and/or lanthanum present as a result of dissociation of the at least one carbide compound, and a uniform distribution of at least one of elemental carbon and CO.

Claim 13 (Original): A process according to claim 12, wherein yttria and zirconia are present in the at least one ingot as yttria-stabilized zirconia.

Claim 14 (Currently amended): A process according to claim 13, wherein the ~~at least one~~ carbide compound has a vapor pressure within one order of magnitude of the vapor pressure of zirconia.

Claim 15 (Currently amended): A process according to claim 12, wherein the at least one ingot comprises two ingots, yttria and zirconia are present within a first of the ingots, and the ~~at least one~~ carbide compound is

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present within a second of the ingots.

Claim 16 (Currently amended): A process according to claim 15, wherein the first ingot consists of yttria-stabilized zirconia and the second ingot consists of the ~~at least one~~ carbide compound.

Claim 17 (Currently amended): A process according to claim 12, wherein the at least one ingot consists of a single ingot that consists essentially of zirconia, yttria, and the ~~at least one~~ carbide compound.

Claim 18 (Original): A process according to claim 12, wherein the ceramic coating consists of yttria-stabilized zirconia, one of Yb_2O_3 , Nd_2O_3 , and La_2O_3 , and at least one of CO and CO_2 .

Claim 19 (Currently amended): A process according to claim 12, wherein the vapor cloud initially condenses on the component so that the ~~at least one~~ carbide compound is present in the ceramic coating, and the ~~at least one~~ carbide compound is then reacted in situ to form the ~~at least one~~ oxide and at least one of the elemental carbon and CO.

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Claim 20 (Original): A process according to claim 12, wherein the thermal barrier coating has a microstructure of columnar grains.

Claims 21 through 32 (Canceled)

Claim 33 (New): A process according to claim 1, wherein the oxygen is present during the evaporating step in excess of that necessary to ensure the deposition of the oxide compounds.

Claim 34 (New): A process according to claim 12, wherein the oxygen is present during the projecting step in excess of that necessary to ensure the deposition of yttria-stabilized zirconia.